

# Ecology and Economy: Systems Changes Ahead?

By David Ing

*One doesn't recognize the really important moments in one's life until it's too late. — Agatha Christie*

Living in a world where systems changes are omnipresent, where do we focus our attention? We read every day about climate change and economic change as major forces that are impacting our world. These forces -- partially under human control and partially not -- are perplexing in their plurality: *systems changes* as beyond stable states we have enjoyed, and beyond the limits that we have previously expected. Action by individuals and groups range from (i) dealing with imminent systems changes when the evidence cannot be denied, to (ii) anticipating negative and positive systems changes on the horizon with proactive foresight.

Let's step through three ideas: (a) three attitudes towards systems changes; (b) human responses to impending tragedy; and (c) surfacing the values that we appreciate.

## A. Three Attitudes Towards Systems Changes

From a systems perspective, climate change and economic change can be seen as complex, and more than complicated<sup>1</sup>. Linear thinkers may prefer to separate climate change and economic change, yet resulting consequences and externalities may be show those changes as not independent. Attitudes towards systems changes can be categorized as (i) best; (ii) both; and (iii) more.

Declaring a pursuit of *best* seems simplest.

- *Systems changes for the best*. We can see an ideal, and should aim towards that.

The greatest good for the greatest number -- utilitarianism -- is a foundation of many large-scale policies where goals are set and we work towards them. As human beings who exercise will, we adopt social contracts both explicitly and implicitly. We often do well individually, by doing good collectively. We accept responsibility not only for ourselves, but also with our neighbours and fellow citizens.

A challenge in enacting changes for the *best* is defining systems boundaries. Who is included in

the "we" that defines the ideal? Have systems changes occurred so that the "we" is to be redefined? Is striving towards that ideal still possible or relevant? In addition to the distinctions of parties included and excluded, questions in engaging or not engaging enemies of rationalism -- politics, morality, religion, and aesthetics<sup>2</sup> -- expand the ways of knowing about systems changes both in the past and at hand. These enemies provide the systems approach with a critical inquiry on learning about itself

Is there a new *best* for our natural world, with changing weather conditions and rising water levels? What do shifts in world trade mean for a new *best* in the products and services that sustain us, and the jobs that support our livelihoods?

A second attitude opens up the possibilities of *both*, beyond just one.

- *Systems changes for both*. We can see multiple paths forward, and don't have to be constrained by only one.

Do we frame our domains as wholes, or as pieces or parts that are smaller in scope, scope and/or speed? We see nations defined with states or provinces, so that differences in conditions can be accommodated. Federal and regional jurisdictions are commonly have laws and practice simultaneously in force, alongside each other. Complex issues become merely complicated, as grassroots efforts make neighbourhood interests tractable. The ability to serve *both* global and local mindsets is more than a "divide-and-conquer" partitioning of resources. Sometimes locally successful ways bubble up to become a national norm; and big systems practices trickle down as the presumed norm.

If systems become dysfunctional, *both* may degenerate into "mine" and "theirs". A communal whole loses its way as parochialism dominates. Disparity, when perceived by some parties on unfairly benefiting or progressing the interests of another group, can lead to potential infighting about "right" and "wrong".

Can we have *both* a better natural environment and improved economic prospects? Unfortunately, predispositions on this question depend on circumstances. Those with a longtime enjoyment of privilege have access to resources, yet may not want to lower their standard of living. Those with newfound wealth are emerging with social and political power, and deal with both the upsides and downsides of abbreviated legacies. Voices on equal opportunity and on equity may show friction both within their communities, and across interactions with others.

A third attitude often sees beyond the immediate, with the potential for a generative *more*.

- **Systems changes for *more*:** Beyond the linear, we can cocreate for the better.

Living systems with free will -- animals are able to move, and plants do not -- are afforded a capability to negotiate with each other for mutual benefit. A whole has properties that are not in its parts. Water has the property of wetness that hydrogen and oxygen do not. Accepting our conditions as a reality, we may then look for systems changes where there could be something *more* in the synergy, beyond just rearranging the parts.

Unfortunately, the possibility of positive synergy raises the possibility of negative synergy. In terms of desirability, we could end up with something *less* than we had before. The nonlinear effect might be foreseeable, or unanticipated. Combining parts together might result in a monster or bargaining towards minimizing losses.

Is there a prospect for *more* in our natural environment and/or our economic wellbeing? The world is not without limits to resources that could be depleted. Economic history shows cycles of growth and recession over longer time horizons.

Attitudes of *best*, *both* and *more* may be considered in a reflective, deliberative mode. What happens, though, if our time is limited? What if we need to respond to systems changes with more haste?

## B. Human Responses to Impending Tragedy

Imagine that we are on the RMS Titanic. For 13 hours, radio signals of field ice had been reported, but not considered urgent. In the moonlit evening, the ship had been travelling at full-speed, the lookout raised an alert about an iceberg dead ahead. Commands from the bridge for hard astarboard aimed to change the ship's course. Ten minutes lat-

er, a direct collision is averted, but a glancing blow of 7 seconds left a 300-foot gash in the hull below the waterline. The captain estimated the ship would stay afloat for only 2 hours. He gave orders to abandon ship. There is room in the lifeboats for only half of the passengers.

Warnings of impending crashes in both the natural world and the global economy are not new. Yet most people are not alarmed into action. We might describe responses generally in three ways:

- **Fight the systems changes:** Never give up!

When the alarm to abandon ship was first issued, some first-class passengers thought that staying aboard the RMS Titanic would be a lower risk than boarding a tiny lifeboat. Below deck, the engineers remained at their posts until the end, ensuring that boilers and electric generators would continue to function, powering the radio for distress signals. Postal clerks struggled to save the mail being carried onboard.

At which point do we accept that an anthropocene has arrived, and human beings have wrought irreversible damage to the planet? What evidence might convince policy makers that institutions are financially bankrupt and unable to return to health?

- **Accept the systems changes:** It's too late!

After all of the lifeboats had been filled, the bands were ordered by the Captain of the RMS Titanic to play in the first class lounge, and eventually the boat deck level. An industrialist changed into top hat and evening dress, declaring his wish to go down with the ship like a gentlemen. Third-class passengers in the below-deck steering levels waited with stoic passivity to be told by superiors what to do.

When the leaders who brought us to the current situation declare that all is lost, will there be new leaders who step up?

- **Hope for systems changes:** History never repeats itself, but it rhymes<sup>3</sup>.

How did the shipping industry and legislators respond to the incident? Inquiries on the sinking of the RMS Titanic in Britain and in the United States did not ascribe negligence to the cruise line company. Standard industry practices had been followed. The British and American investigators both found fault with regulations specifying an inadequate number of lifeboats, and with the captain who had failed to take heed of ice warning. The notoriety of the disas-

ter did, however, eventually lead to changes in maritime regulations on safety measures, and harmonization of an International Convention for the Safety of Life at Sea.

From the 1960s through to the early 21st century, regulations on environmental protection and financial controls were enacted in the Western world. Into the 21st century, statistics on improvements in the environment over the past 40 to 50 years have been published<sup>4</sup>. In almost all countries of the world, the real GDP per capita has shown growth over the past 50 years<sup>5</sup>. Should we enjoy the ride that we're on, or be more vigilant when looking to the future?

Some adults perceive a world so dystopian that bringing additional children into the world is not a legacy they can face. However, for those who have actively chosen to raise a family, there's an element of hope. Our children will enjoy lives in a world different from their predecessors. Parents anticipate that each child might contribute towards bettering the world.

### C. Surfacing the Values We Appreciate

Relating our current situation to the prospect of a ship sinking provokes a question: are we collectively, (i) living for today, or (ii) living for the future. Our actions as individuals are expressions of values that we each embody. Those actions may have influences and impacts on family, friends, and neighbours.


Each of our worlds is at the intersection of many systems. Let's consider the interplay between two narratives on interventions, with systems changes on (i) structural quality, and/or (ii) dynamical quality<sup>6</sup>.

- *Structural quality* is primarily static, observed as reliable desired function through an elaboration of form or relationship.
- *Dynamical quality* is creative, denying the premise of the static, towards changing the function of systems that may already be functioning well.

Philosophically, structural quality relates more to *being*, while dynamical quality relates to *becoming*<sup>7</sup>. The former tends to see human beings occupying a static dwelling at a point in time. The latter sees animate beings as inhabiting a world that is alive in a trail of movements and contributing to the weave of a meshwork. With systems changes, the range of affordances -- as cues in natural environments that hold possibilities for action -- may become expanded or reduced<sup>8</sup>. Systems in their youth enjoy the opti-

mism of affordances yet to come; systems in their maturity, that have enjoyed well-functioning affordances, may or may not notice their decline or impact on others<sup>9</sup>.

Anticipatory appreciating inquires on the norms or standards we seek. Do we have (i) clear *reality judgements* on the facts of the state of systems; and (ii) cognizance of *value judgements* on the significance of those facts? With those, we can make effective (iii) *instrumental judgements* on actions that we might or might not take on resetting norms<sup>10</sup>. As progress in the 20th century has enabled many of us to enjoy higher standards of living, should we anticipate that the 21st century will allow us to continue that trajectory?

We live in a world where two mindsets are entangled: (i) systems changes where learning orients towards *more-leading-to-more*, alongside (ii) systems changes where learning orients towards *less-leading-to-more*. More-leading-to-more aims to replicate a world we enjoy, yet the current course and speed may not be sustainable. Less-leading-to-more<sup>11</sup> is premised on intervention(s) when resources are still available to regenerate a new world, yet the new world seems less certain than the one we know. The window of opportunity to make a choice may be closing, so that if we are not proactive, the decision may be made for us. Is it now too late? 

*I have two kinds of problems, the  
urgent and the important.  
The urgent are not important, and  
the important are never urgent.*

— Dwight D. Eisenhower

**David Ing** is a past-president of the International Society for the Systems Sciences. He is one of the cofounders of *Systems Thinking Ontario*, a trans-disciplinary conversation group that meets monthly in Toronto. This article extends the discussion from a special session at the CANSEE 2019 meeting on "Systems Changes, Environmental Deterioration" with David L. Hawk. The *Systems Changes research program*, as an open science initiative, surfaces ongoing work at <http://systemchanges.com/online/>.

## References

1. Particularly in ecological systems, the distinction between complexity and complicatedness is sharp. "... complexity is about purpose of the whole, as it is captured in the constraints that relate the parts to each other and the whole. Degrees of freedom are lost as units become parts. Complexity pertains to the degrees of freedom that are taken away so the parts can function as such." Timothy F.H. Allen, Preston Austin, Mario Giampietro, Zora Kovacic, Edmond Ramly, and Joseph Tainter. 2017. "Mapping Degrees of Complexity, Complicatedness, and Emergent Complexity." *Ecological Complexity*, June. <https://doi.org/j.ecocom.2017.05.004>.
2. In the 1970s, when the systems approach was argued by some as too rational, the impetus for critical systems theory arose. Some foundations are in C. West Churchman. 1979. *The Systems Approach and Its Enemies*. New York: Basic Books.
3. While this aphorism is often attributed to Mark Twain, there's no substantive support for the ascription. The first citation seems grounded in 1970, says <https://quoteinvestigator.com/2014/01/12/history-rhymes/>
4. To 2016 from 1970, reflection of the improvements in the environment were cited. "49 environmental victories since the first Earth Day", Brian Howard, *National Geographic*, April 22, 2019 at <https://news.nationalgeographic.com/2016/04/160422-earth-day-46-facts-environment/>
5. Charted from 1960 to 2014, very few countries have stagnated, while the strongest (Botswana, South Korea, Romania, China and Thailand) show growth from 38-fold to 11-fold. Max Roser, "Economic Growth". Our World in Data. <https://ourworldindata.org/economic-growth#economic-growth-over-the-long-run>
6. Hierarchy theory builds on Robert Pirzig's (Zen and the Art of Motorcycle Maintenance) metaphysics. The concepts of quality and narrative have a place in science, say T.F.H. Allen, T. F. H., Joseph A. Tainter, J. Chris Pires, and Thomas W. Hoekstra. 2001. "Dagnet Ecology—'Just the Facts, Ma'am': The Privilege of Science in a Postmodern World." *BioScience* 51 (6): 475. <https://academic.oup.com/bioscience/article/51/6/475/240648>.
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8. The ecological psychology of J.J. Gibson is foundation in ecological anthropology, as with Tim Ingold, 2000. "General Introduction." In *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*, 1–7. Routledge.
9. Affordances can be seen "at hand" in inhabiting disclosive spaces, as Chapter 7 in David Ing, 2017.
10. Appreciative systems generally focused on regulatory policies for the present. Living organisms may or may not anticipate changes going on in systems, entailed to happen in the future. The works of Sir Geoffrey Vickers and Robert Rosen influence Chapter 8 in David Ing, 2017.
11. With innovation programs, we may also be blind to the possibility of more-leading-to-less. Chapter 9 in David Ing, 2017 builds on Ian I. Mitroff, 1986. "The Complete and Utter Failure of Traditional Thinking in Comprehending the Nuclear Predicament: Why It's Impossible to Formulate a Paradox-Free Theory of Nuclear Policy." *Technological Forecasting and Social Change* 29 (1): 51–



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## **ON THE COVER**

### **Sayeh Dastgheib-Beheshti**

The Canadian Society for Ecological Economics (CANSEE) 2019 Conference logo is combined with hand drawings and prints from the community mural drawn at the conclusion of the conference. You can see pictures of this creative and reflective project on page 4. The aim of this cover design was to capture the sense of community that permeated the entire conference.

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CANSEE 2019 partnered with RISE Waterloo Region to facilitate a community mural painting in Waterloo public square on May 26, 2019. This offered an opportunity for conference delegates as well as community member to creatively think and critically reflect on the issues discussed during the conference. You can view additional pictures on their Facebook page at:

[https://www.facebook.com/pg/risewaterlooregion/photos/?tab=album&album\\_id=436862686889838](https://www.facebook.com/pg/risewaterlooregion/photos/?tab=album&album_id=436862686889838)



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